Acquisition in the Digital Information Age: A SMART Perspective

Digital Strategy Development _Begins_ With Technology!

Digital Strategy Design Principal Lens

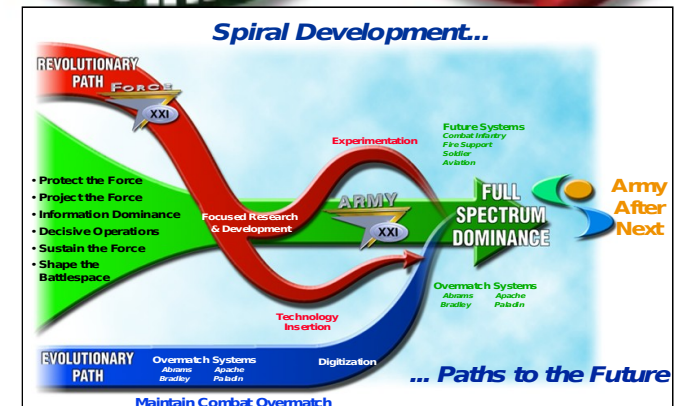**Technology Push - Immature Technologies to Maturity**

PRESENT

FUTURE

Reshaping the Landscape

Building New Connections

Redefining the Interior

Problem Pull - Reach for Technology

Virtuous Cycle = Technology Push & Problem Pull Operating Together - Processes Become Indistinguishable
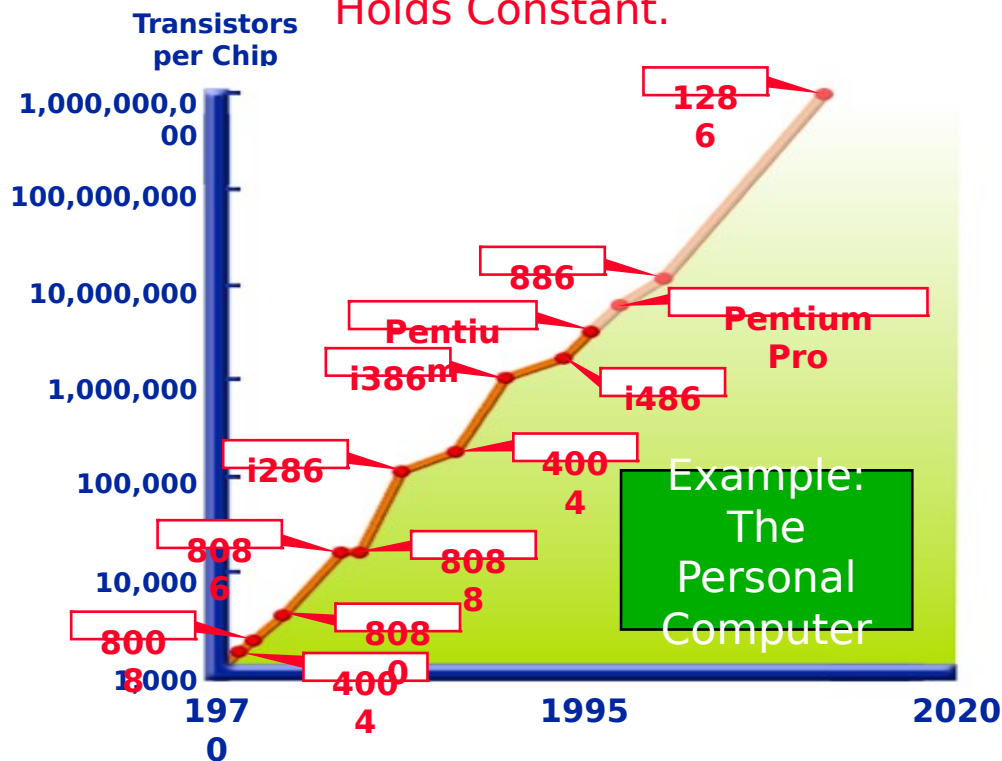
*From the book "Unleashing the Killer App" by Larry Downes/Chunka Mui

The Army's Process of Change

Spiral Development...

REVOLUTIONARY PATH

- Protect the Force
- Project the Force
- Information Dominance
- Decisive Operations
- Sustain the Force
- Shape the Battlespace

Experimentation

Future Systems
Combat Infantry
Fire Support
Soldier
Aviation

Focused Research & Development

FULL SPECTRUM DOMINANCE

Army After Next

Overmatch Systems
Abrams   Apache
Bradley   Paladin

Technology Insertion

EVOLUTIONARY PATH

Overmatch Systems
Abrams   Apache
Bradley   Paladin

Digitization

... Paths to the Future

Maintain Combat Overmatch

Laws of the Digital Universe

Moore's Law: Every 18 Months, Processing Power Doubles While Costs Holds Constant.

Transistors per Chip
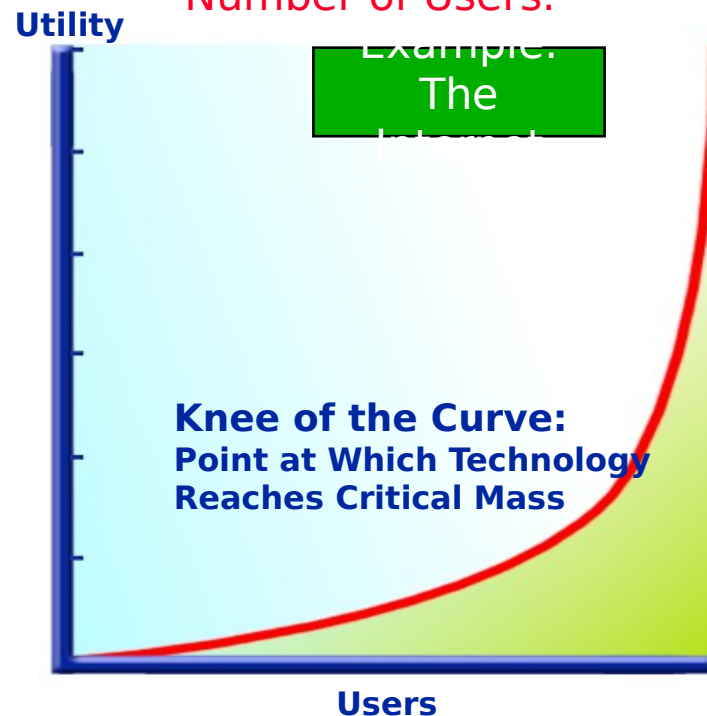
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Example: The Personal Computer

1970   1995   2020

Acquisition Corollary: Technology can be exploited by an increasingly greater population. The US Army must be on the forefront of leveraging technology or risk losing its overmatch capability.

From the book "Unleashing the Killer App" by Larry Downes/Chunka Mui

Metcalfe's Law: The Utility of a Network Equals the Square of the Number of Users.

Utility

Example: The Internet

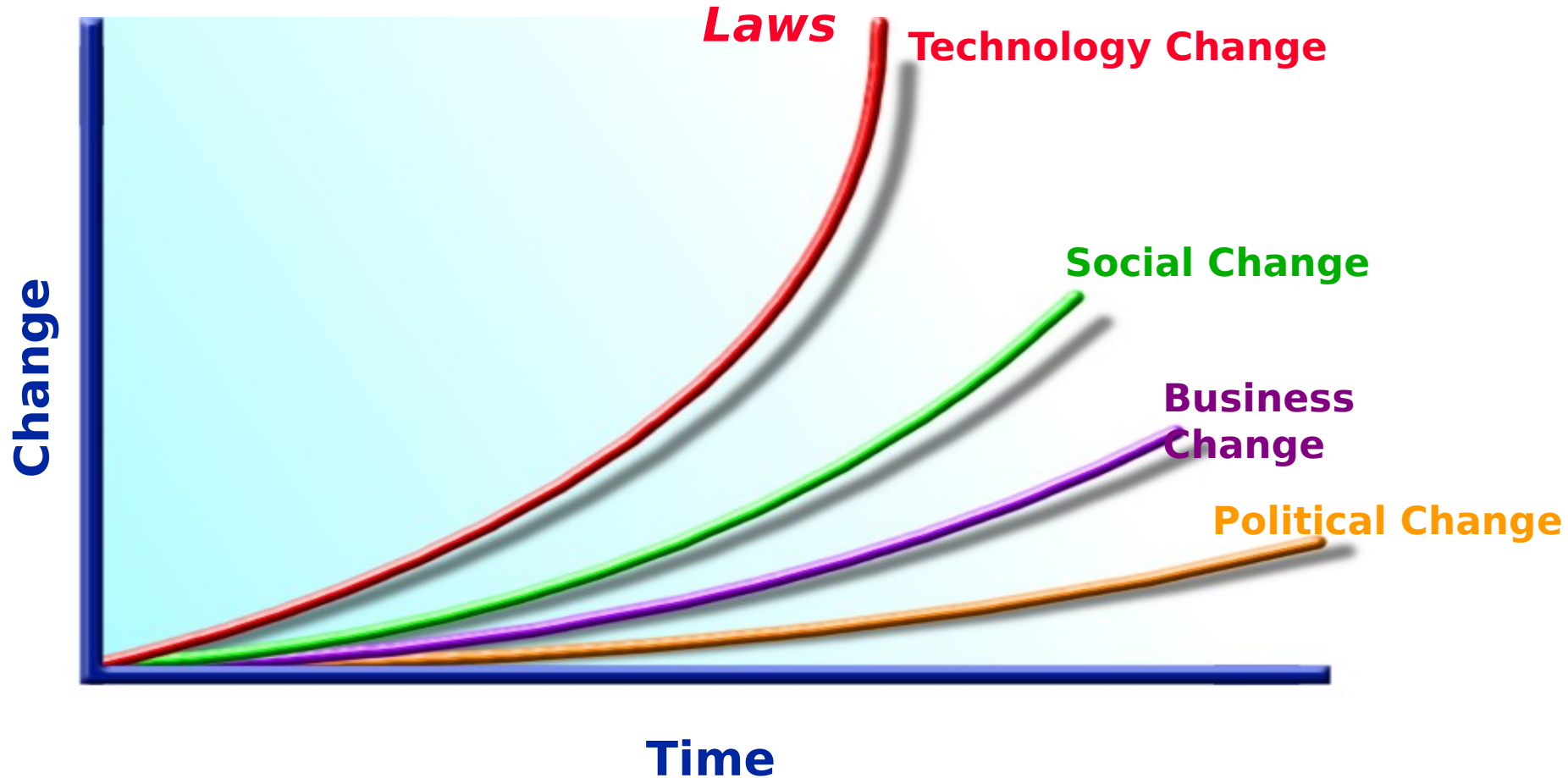**Knee of the Curve:** Point at Which Technology Reaches Critical Mass

Users

Acquisition Corollary: Army Acquisition effectiveness in fielding equipment is exponentially proportional to the collaboration & interoperability with Requirements and Training.

"Soldiers Are Our Customers"

The Law of Disruption

Law of Disruption = Combination of Moore's and Metcalfe's Laws

Technology Change

Social Change

Business Change

Political Change

Change (vertical axis)

Time (horizontal axis)

Social, Political and Economic Systems Change Incrementally, but Technology Changes Exponentially!

From the book "Unleashing the Killer App" by Larry Downes/Chunka Mui

Field modernized equipment characterized

- **Reduced Total Ownership Cost (TOC), Time to Initial Operating Capability (IOC), and Logistics Tail**

- **Increased Supportability, Maintainability, and Military Worth**

- **More Effective, Cost Efficient Training at Individual, Crew, and System Level**

Organizations will evolve from focused weapon system/mission area acquisition programs and Research, Development, and Engineering Centers (RDECs)...

• individuals' participating in integrated digital enterprises based on acquisition events and less tied to an organizational identity

• currently existing "rice bowls" and "stovepipes" will become so blurred, organizational boundaries will exist only to serve administrative needs vice facilitating execution of specific missions

Operational Concept Evolution

Operations traditionally conducted in a "Waterfall" approach will become more spiral and instead of a deliberate phased approach; will become more experimental...

•   Moore's Law precludes successful acquisition in traditional 10 -20 year time spans; it also provides the technologies that allow a more iterative, experimental approach at less cost.

•   Collaboration between user, builder(industry and PMs), and trainer will occur concurrently through Integrated Digital Environments (IDE) in which data is transferred seamlessly across COTS tools and applications
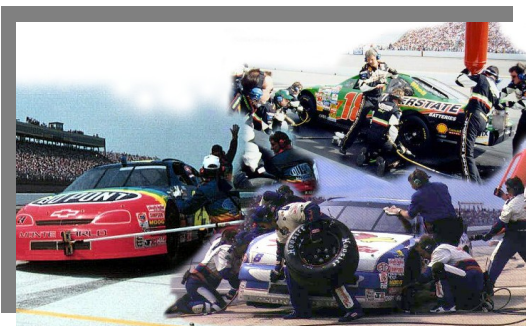
Simulation and Modeling for Acquisition, Requirements, & Training (SMART)

Bran Ferren's "Big Idea"

Pit Stop Engineering

Simulation and Modeling for Acquisition, Requirements and Training (SMART)

The Army's vision for SMART is a process in which we capitalize on Modeling and Simulation (M&S) technology to address the issue of system development and life-cycle costs through the combined efforts of the requirements, training and

- **SMART Enables the Acquisition Workforce to Depict System Design Alternatives Digitally and Provide Access to all System Stakeholders**

- **Distributed Access to Developing Digital Design Allows Assessment of Proposed Changes for Impacts to all Acquisition Functions**

- **System Design Evolves With Optimization Across all Functions Vice at the Expense of one Another**

- **Iterate System Design to Maximize Pit Stop Engineering**
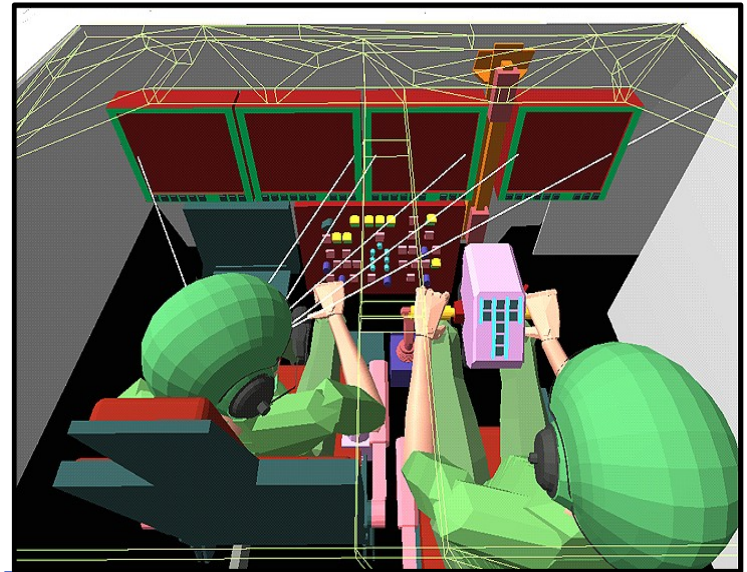
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"Context is worth 50 IQ points."

Alan Kay, Walt Disney Imagineering Fellow

- **Provide Continuous User Context**

- **Cost/Performance Tradeoff Analysis**

- **Early ID of Unrealistic Requirements**

- **Early ID of Enabling Technologies**

- **Earlier Opportunity to Address Life Cycle Cost**

- **Use Virtual Prototypes to aid Threat Assessment & Mission Area Analysis**

What is the Role of the Training Community?

- Provide Early and Continuous Training Context

- Assess Impact of TTP and Doctrine on Design Concepts

- Trained Crew Simultaneous w/ 1st Unit off Production Line

- Re-use of Software and Simulation to Support Embedded and Distributed Training, Operation Planning, Course of Action (COA) Analysis; Part of Deployed Capability
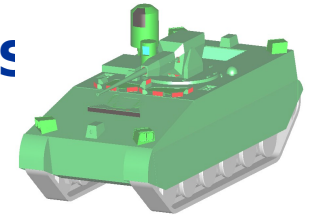
SMART Flagship Programs

- **Crusader Program Operates Within a Digital Integrated Environment That Digitally Links the PMO, Contractor, TARDEC, Assorted Test Ranges, and Other Activities**

  - **Apache Poised to Re-assess Basic Load, Capitalize on PIPs to Re-engineer Logistic Support**

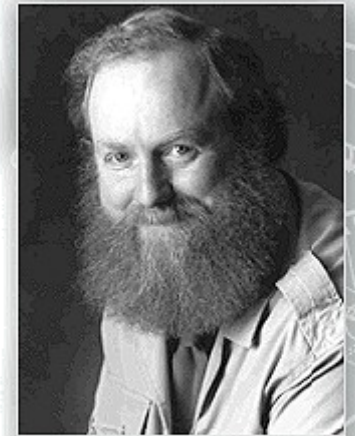- **FSCS Ideally Poised to Benefit From SMART and Pit S Engineering**

  - **CCTT can be Employed to Explore Doctrine and TTP for Future Systems to Influence Final Design**

What's the "Big Idea"?

"**There are 2 types of people; Requirements people and "Big Idea" people. Requirements people like to deal in deliberate detail, while "Big Idea" people start with a general vision and create from there...the Army's "Own the Night" initiative is a Big Idea"**

Bran Ferren, Executive VP for Creative Technology, Walt Disney Imagineering

Leveraging the "Big Idea"

- **Build a little, test a little**
- **Strike a balance between specifics and creative ingenuity**
- **Stakeholders look over each other's shoulders electronically**
- **Collaboration takes place through manipulation of electrons instead of atoms**

Strike Force C4I Component

- **Experiment using "Big Idea" Approach**

- **University Affiliated Research Center & TRADOC Simulation Laboratory**

- **Demonstrate application and combat effectiveness of "user interface agents" that automatically...**

  - **notify crew when fluids (hydraulic, engine oil) need replenishment/replacement based on in-line condition monitoring data**
  - **compute mileage vehicle can travel based on fuel capacity and proposed mission parameters**
  - **scan local digital broadcasts and report relevant geopolitical info**
  - **conduct Course of Action Analysis (COA) faster than real time & recommend best COA**
  - **other value added assistance to reduce demands on crew**

Pit Stop SMARTs

In Racing, the Checkered Flag Does not Always go to the car With the Most Horsepower … But to the Vehicle Designed to Maximize Benefit From the Pit Stop!

Pit Stop Attributes

Time becomes a critical design parameter.

- **Rapid ... Reduced Time to Field Equip**

- **Well Choreographed ... Highly Tuned**

- **Highly Efficient ... Optimized Logistics**

- **Highly Trained Crew ... Well Honed Trained & Ready Force (System Operations and Supportability)**

- **Minimum Tools ... Makes Maintenance Easier & Quicker**

- **Specific Design Characteristics ... Equipment Designed to Maximize Benefit From Doctrine, Logistics, and Training**

While U.S. Systems are Down for Repair and Refueling, Opposing Forces Continue to Advance and Gain the Advantage.

Pit Stop Engineering Can Be Applied To ...

Task Steps
- Platoon Conducts Refuel on the Move
- Refuels IAW OPORD/FRAGO (Should Designate Location, Time, and Amount of Fuel per Vehicle)

Pit Stop Engineering Could Effect:

- **The Speed and Ease With Which Fuel is Transferred, Affecting:**

  – The Reduced Time Tanks are in an Immobile, Vulnerable Position

  – The Reduced Frequency With Which Tanks are Required to Refuel

  – The Increased Distance Tanks can Travel Between Refueling

  – The Reduced Number of Personnel in the Refueling Process

  – The Reduced Training Time Required for the Refueling Process

  – The Possibility Refueling can be Accomplished Without Stopping

BOTTOM LINE: Tanks are returned to the battle quicker, maintaining greater firepower on the objective!

"Soldiers Are Our Customers"

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Life Cycle Costs

- **Pit Stop Engineering provides the opportunity to impact Total Ownership Costs (TOC).**

- **As sustainment operations become more efficient in terms of time, manpower, tools, etc., an exponential reduction in costs results:**

  Less manpower means less reduce logistics burden to support personnel

  Fewer tools means less equipment to transport which means less transport equipment required, which means, less logistics burden to support the transport equipment.

- **TOC Assessments can be conducted using cost models integrated with logistics models**

- **As design proposals change, impact on TOC can be predicted through simulation**

- **Legacy Systems:**
  - Planned Product Improvements (PIPs), Engineering Change Proposals (ECPs), etc. are all Opportunities to Apply Pit Stop Engineering. Use of M&S Through SMART Provides the Means to Hone System Design Changes Without Hardware Prototype "Trial and Error"

- **New Systems:**
  - New System Development Efforts can Design in "Rapid, Tool Free Maintenance", Proposed Doctrine, and Minimized Support

Pit Stop Philosophy...Systems designed to maximize performance in battle, logistics, and training take home the flag

- **Break Some China/Crack Some Rice Bowls**

- **Will Require All of Us to Bend a Little**

- **Acquisition, Requirements and Training Communities need to start making demands of Leadership and Functional Areas:**

      - support in developing collaborative environment
      - support in developing/adopting data interchange   standards
      - leverage commercial efforts, tools, & technologies
      - deliver common synthetic environment
      - deliver common synthetic threats

Facing the
Future...

Together

1916-23